## 4. On some new Fishes from the English Wealden and Purbeck Beds, referable to the Genera *Oligopleurus*, *Strobilodus*, and *Mesodon*. By A. Smith Woodward, F.Z.S., of the British Museum (Natural History).

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(Plates XXVIII. & XXIX.)

The list of genera and species of Upper Mesozoic fishes met with in the English Purbeck and Wealden beds is already somewhat extensive, many contributions to the subject having been made by Agassiz and Egerton. There still remain, however, several undescribed species well represented in collections; and a few of these in the British Museum, referable to the three genera enumerated above, form the subject of the following notes. Researches already published have indicated a close connection between the fish-fauna of the English Purbeck beds and that of the Upper Jurassic Lithographic Stones of France, Bavaria, and Würtemberg; and the new forms now described tend to demonstrate that alliance even more clearly. The British fossil remains of *Oligopleurus* are also worthy of special note, apart from questions of distribution; for their comparatively satisfactory state of preservation adds much to our knowledge of the osteology of this genus, which has hitherto been only imperfectly elucidated.

### Genus Oligopleurus.

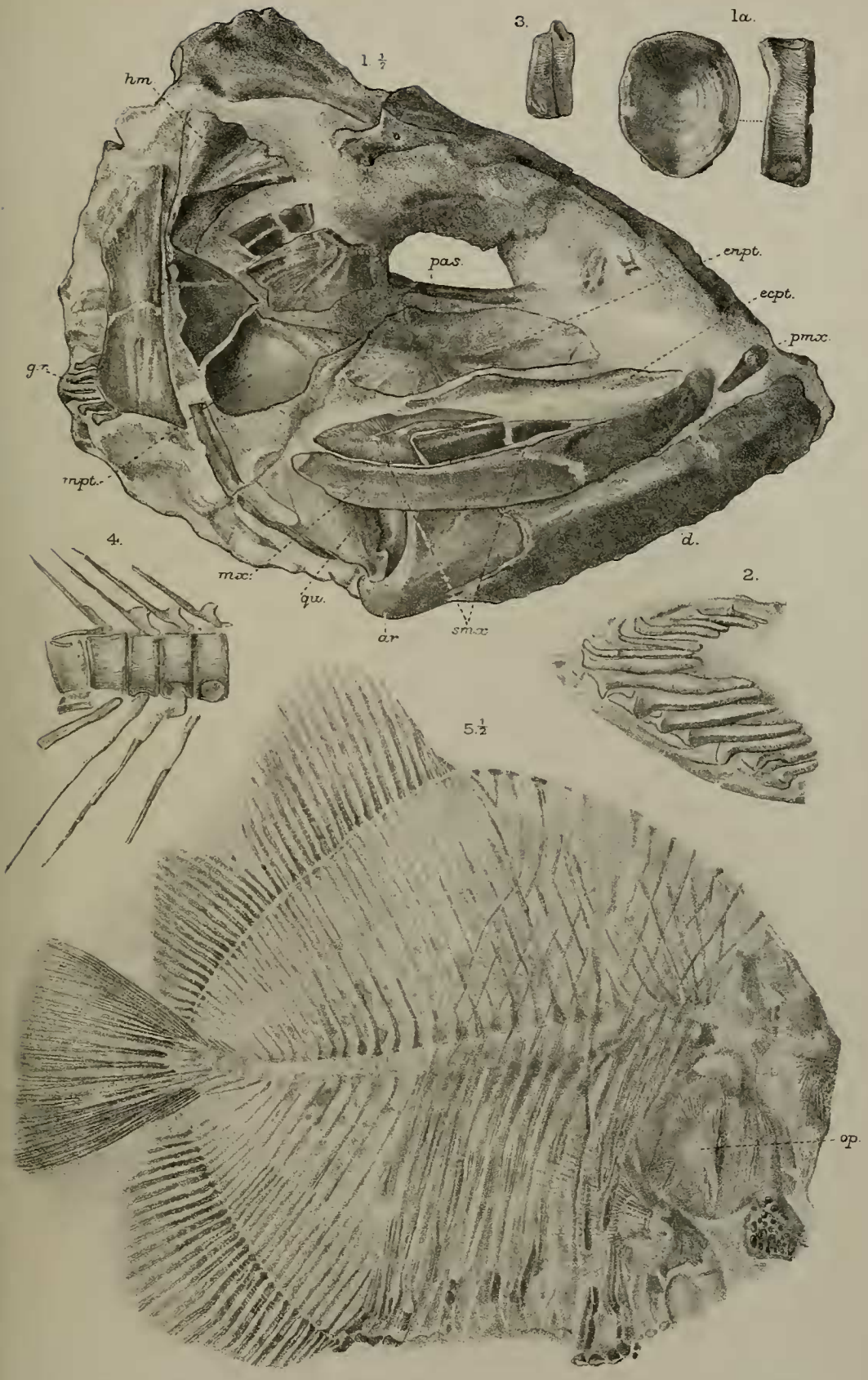
[V. Thiollière, Poissons Fossiles du Bugey, pt. ii. 1873, p. 21.]

Oligopleurus vectensis, sp. nov. (Plate XXVIII. figs. 1–4, Plate XXIX. figs. 1, 2.)

The specimen to be regarded as the type of this species is a large laterally compressed skull and mandible from the Wealden of the Isle of Wight (Brit. Mus. no. 42013), shown, of one half the natural size, in Plate XXVIII. fig. 1. A group of scattered head- and opercular bones, with a series of vertebral centra of an equally large individual, from the same formation and locality (B.M., no. 42014), exhibit some further osteological details. Moreover, the characters of the mandibular symphysis, gill-rakers, and a single vertebral centrum in the first-mentioned fossil show that an imperfect specimen from the Purbeck beds, erroneously determined by Agassiz as *Lepidotus minor*[1], must be assigned to the same form; and this discovery leads to the identification of other Purbeckian fragments of the axial skeleton, which elucidate additional features of some interest and taxonomic importance.

*Skull, Mandible, and Opercular Apparatus.*—The type specimen is much crushed and broken, but, as shown by the figure (Plate XXVIII. fig. 1), several of the elements are distinguishable and well preserved.

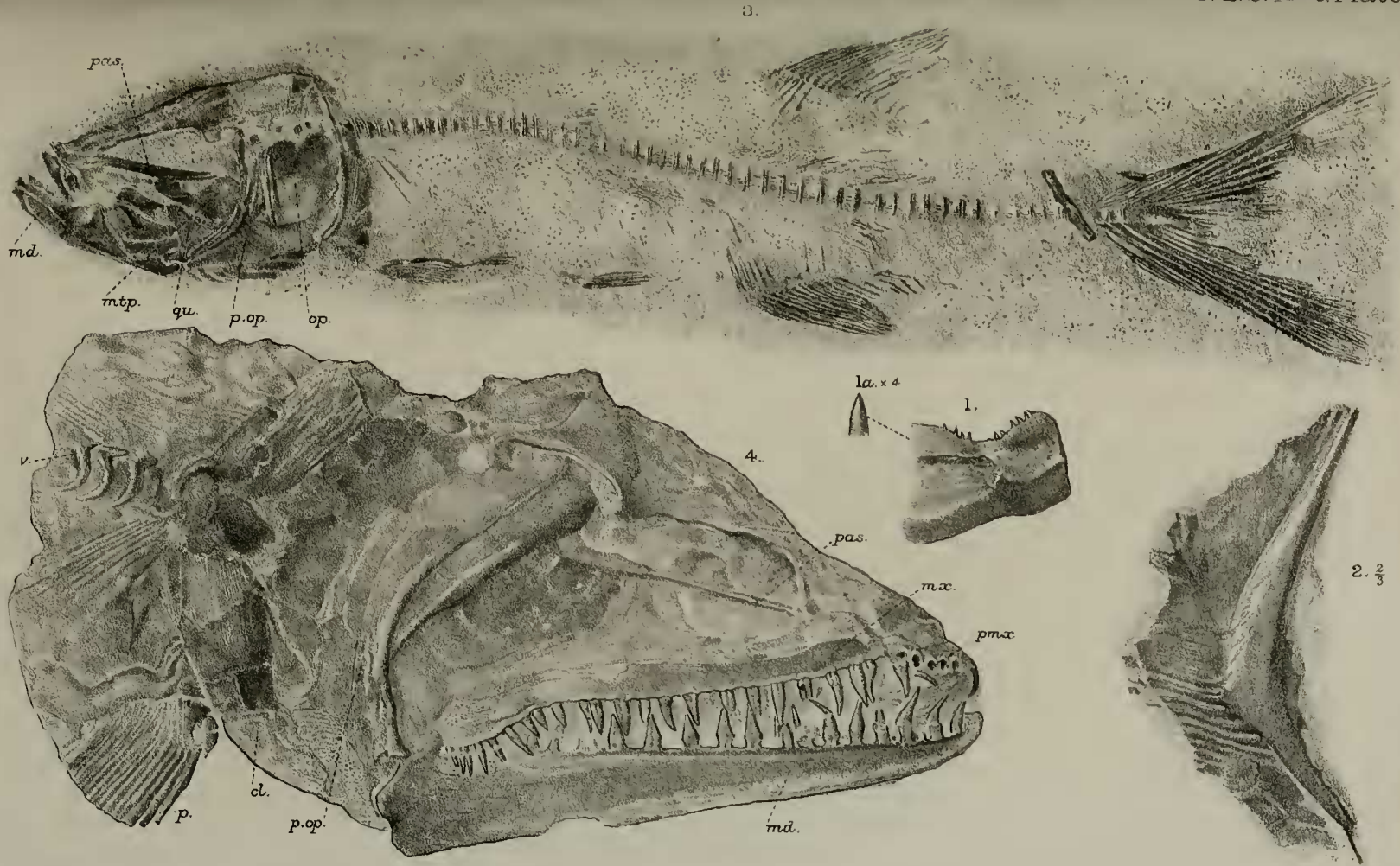
[1] Rech. Poiss. Foss. vol. ii. pt. i. (1844). p. 269, pl. xxix. *c*. fig. 12.




G. M. Woodward, del. et lith.

West, Newman. imp.

1-4. Oligopleurus vectensis.
5. Mesodon daviesi.




G. M. Woodward del. et lith.

West, Newman. imp.

1, 2. Oligopleurus vectensis. 3. Oligopleurus (?vectensis).
4. Strobilodus purbeckensis.

The head is of triangular shape, much laterally compressed, and measures about 0·18 in length by 0·16 in maximum depth at the occiput. The cranial roof is broadest at the occipital border, gently arched from side to side, and produced sufficiently downwards behind the eye to form a considerable portion of the posterior border of the orbital space; there is a longitudinal median depression attaining its maximum depth and greatest breadth immediately behind the interorbital region and gradually becoming shallower in front and behind; while none of the bones appear to have been ornamented, the only superficial markings being radiating rugæ and ridges, evidently due to the ordinary processes of growth. No details of the cranial osteology can be deciphered; but it is clear that there was originally no ossified interorbital septum, and there is a fragment of the *parasphenoid* (*pas.*) in position, which shows that this bone was narrow in the middle region of the skull. In the mandibular suspensorium, the *hyomandibular* (*hm.*) is conspicuous, but its inferior portion and connections are unfortunately destroyed; the upper part of the bone is triangular in form, much expanded and laterally compressed, and at the median constriction the direction of compression becomes antero-posterior. Of the means of connection between this element and the quadrate, nothing can be discerned; but the latter bone is well shown, in position, with its condyle adjoining the socket of the articular element of the mandible. The *quadrate* (*qu.*) is triangular in shape, thinning out at its notched superior border,—the hinder margin being thickened, gently arched, turned outwards, and continued upwards as a long slender process; while the articular condyle is somewhat constricted from the main part of the bone, and has a robust, inwardly-directed process arising from its base. The last-named process is only distinguishable on the left side of the fossil, but is there prominent and not readily explained. Of the pterygo-palatine arcade, three elements are seen from their outer lateral aspect. The *metapterygoid* (*mpt.*) is nearly as deep as long, triangular, with a thickened superior border and attenuated postero-lateral and antero-lateral margins; it is gently bent, being outwardly concave behind and outwardly convex in front. The *entopterygoid* (*enpt.*) is broadest posteriorly, much elongated, with a nearly straight outer inferior border and an irregularly curved inner superior border, these gradually converging to a rounded apex in front; the bony lamina is placed more nearly in a horizontal than in a vertical position, is sharply curved downwards at its postero-lateral angle, and appears concave when viewed from the outer aspect above. The *ectopterygoid* (*ecpt.*) is a long, narrow, lamelliform bone, apposed to the outer border of the entopterygoid, and apparently extending somewhat in advance of this; but its exact form and proportions cannot be discerned. The *premaxilla* (*pmx.*) was evidently small, but only an imperfect fragment remains. The *maxilla* (*mx.*) is a long, narrow, laterally compressed, and gently arched bone, of almost uniform depth, except in its anterior third, which gradually contracts and ends in a stout, inwardly directed process; the oral border is convex, and the hinder two-thirds of the

superior border exhibit a deep, narrow depression overlapped by two *supra-maxillary* bones (*smx.*). Of the latter the hindermost is irregularly triangular, pointed behind, deepest in front, with a sharp re-entering angle on the anterior border, and a long antero-superior process; the second element is also triangular, but much elongated, its narrow base fitting into the re-entering angle just mentioned, and its tapering apex directed forwards. In the mandible, the *articular* bone (*ar.*) is laterally compressed, abruptly truncated behind, narrow beneath the socket for the condyle, and much expanded forwards in the form of an elevated triangular plate. The *dentary* (*d.*) is long, thin and deep, abruptly truncated at the symphysis, but too much crushed to exhibit all the details of form. The mandibular suspensorium is somewhat inclined forwards, and the dentary symphysis evidently projects in advance of the premaxillæ. Of cheek-plates and circumorbitals almost all traces are lost, but fragments of a thin lamina of bone, above and exterior to the metapterygoid, may probably be assigned to this category; they are marked by somewhat radiating ridges. Of the hyoid arch and its appendages, the right *ceratohyal*, with the distal end of the *epihyal* in position, is exhibited in the small Purbeck fossil described by Agassiz, and there seems to be evidence of small, slender, widely spaced *branchiostegal rays*. The operculum and suboperculum are not distinctly recognizable in any specimen; but the *preoperculum* (Plate XXIX. fig. 2) is a characteristic element. This bone is of considerable size, narrow and deep, with a broad, much thickened anterior border; its lower limb is relatively large, meeting the upper limb in a sharp angulation; and the hinder expansion of the upper limb is almost smooth, while that of the lower limb is separated from this by a transverse ridge and is itself marked by three or four rounded, parallel, or somewhat divergent ridges.

*Dentition.*—The oral margin of the maxilla is thickened, rounded, and regularly reticulated in such a manner as to suggest the original presence of a uniform cluster of very small teeth. None of these are preserved; and the teeth of the mandible are also not shown, its dentigerous border being obscured by pyritous matrix and the overlap of the maxillæ. In the small Purbeck fossil, however, the symphysial end of the right dentary is well exhibited (Plate XXIX. fig. 1). Here are preserved a few small, stout, conical teeth, which seem to have formed part of an irregular spaced series, around and between which were still more minute teeth.

*Branchial Arches.*—In the postero-inferior region of the type specimen, a short vertical series of small, horizontally directed, thick rods is conspicuous (*g.r.*), though very imperfectly preserved; and the appearance of these fragments is at first suggestive of the base of a powerful pectoral fin. The supposed *Lepidotus minor* of Agassiz, however, explains that the structures in question are referable to the branchial apparatus; and in the last-mentioned fossil one of the arches is tolerably well displayed from the outer aspect (Plate XXVIII. fig. 2). A most singular feature is thus made known, the arch being provided with a close series of enormous bony gill-

rakers (the fragmentary rods of the type specimen), each of these being smooth and elongated, with a slight constriction immediately above its base, and tapering to a point distally.

*Vertebral Column.*—A single centrum attached to the occipital portion of the type specimen (Plate XXVIII. fig. 1 *a*) shows that the vertebræ were completely ossified, while the second Wealden fossil and some of the Purbeckian specimens reveal the principal characters of the anterior part of the vertebral column. The centra are narrow and distinctly amphicœlous, much deeper than broad, and marked on the sides by fine transverse striations extending between a thickened rim anteriorly and posteriorly; a pair of deep pits on the upper aspect accommodates the neural arch, and there is a similar pair of pits on the ventral aspect for the insertion of a hæmal arch. The only traces of attached peripheral elements on the sides of the centra consist in a small, faint, rounded pit or rugosity on four or five of the anterior vertebræ in the so-called *Lepidotus*, which may have supported an intermuscular bone. The first vertebral centrum, articulating with the basioccipital, is composed of two thin discs fused together (Plate XXVIII. fig. 3), but the others are all simple, each bearing its own arch. The neural spines (Plate XXVIII. fig. 4) are long and slender, fixed to delicate, low arches, with prominent zygapophyses; and if the fossil that best displays these structures gives equally reliable indications of the hæmal elements, the latter have the form of very feebly developed ribs. Two long curved bones in the second of the large Wealden specimens are also at first sight suggestive of ribs, and seem to indicate a greater development of these structures than is here shown; but the elements in question are not certainly determinable and may be branchiostegal rays.

*Generic and Specific Determination.*—That the fossils now described pertain to the genus *Oligopleurus* seems evident from the form and proportions of the jaws and dentition, the characters of the vertebral centra, and the slight development of the neural and hæmal arches. The absence of scales is explained by their extreme tennity in the fish of the Lithographic Stone, and the coarse nature of the matrix in which the new Wealden and Purbeck specimens occur.

These fossils, however, scarcely suffice for a specific determination, and unless the small immature individual from the Purbeck beds, shown, of slightly reduced size, in Plate XXIX. fig. 3, be the young of the form under consideration, no precise diagnosis can as yet be attempted. That the larger fossils now described represent a distinct species from the typical *O. esocinus*, seems to be indicated by the narrowness and greater relative depth of the anterior vertebræ in the English specimens; and they may thus be provisionally named *O. vectensis*, from the discovery of the first and best-preserved fossil in the Isle of Wight. If, however, the small fish just referred to prove to be truly referable to the same species, it will readily be distinguished by its much more slender proportions—the depth of the trunk at the position of the pectoral arch being comprised nearly seven times in the total length, whereas in *O. esocinus* the same